IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Kim Lui SO

Docket No.: SO-2

Serial No.: 10/524,309

Art Unit: 3749

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Examiner: PRICE, Carl D.

Title: Self-Cleaning Exhaust System and Method

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Affidavit of Kim Lui SO

Dear Sir:

I, Kim Lui SO, of 20 Boon Lay Way #01-168 TradeHub 21 Singapore 609967 do hereby declare and affirm as follows:

1 I am the inventor of the invention of US patent application 10/524,309.

2 I am a mechanical engineer having graduated from Taiwan University in 1990.

3 I have been involved in the kitchen exhaust industry since 1993 and have my own business dealing with the manufacture, supply, installation, cleaning and maintenance of kitchen exhaust systems. That business has been in operation since 1996 and is presently operating in Singapore and Hong Kong. I consider myself to have at least ordinary skill in the technologies of kitchen exhaust systems.

4 The kitchen exhaust systems of my business are usually installed in restaurants, hotels, commercial premises, and in the kitchens of large ships.

5 I have read and understood the official communication date June 26, 2008 from the examiner Carl D. Price. I have also read and understood each of the references cited in that official communication.

6.1 I will firstly explain the difference between a baffle and a filter. A baffle creates a tortuous air-flow path that will normally have a number of sudden and abrupt changes of

direction that cause contaminants in the air flow to be forced out of the air flow. As all normal contaminants in the air flow of kitchen exhaust system are heavier than air, the tortuous flow path can easily cause contaminants to exit the air flow. The contaminants may be captured by the baffle but normally fall or are forced onto something separate from the baffle. A baffle inherently interferes with the air flow and may create significant disturbance to the air flow and/or a significant reduction in the speed of the air flow. The air flow characteristics after a baffle may be quite different to the air flow characteristics before the baffle.

6.2 A filter creates a significant increase in the surface area over which the air flow passes. This significant increase in surface area causes the contaminants to be captured by the filter. Although a filter will inherently interfere with the air flow, it should not create any significant disturbance to the air flow such that the air flow characteristics after the filter are generally the same as those before the filter – at least while the filter is not clogged. This includes the air flow speed. The air flow speed after a filter should be only slightly less than the air flow speed before the filter – at least while the filter is not clogged. This is why filters are preferred in kitchen exhaust systems rather than baffles.

6.3 In normal filters, the filter normally captures the contaminants. The contaminants will slowly clog the filter until the air flow through the filter is significantly reduced. The filter should be regularly removed for cleaning to prevent undue slowing of the air flow.

6.4 Filters in kitchen exhausts capture contaminants such as, for example, oil, grease, food particles and some moisture (water). Those contaminants are normally quite hot when captured. If the filter is cleaned when cool, the grease and oil will have cooled and therefore is far more difficult to clean. A similar situation exists with baffles.

6.5 Due to these differences between baffles and filters it is not possible to simply interchange baffles and filters. For example, the fan and the fan motor may need to be changed to allow for the different air flow characteristics of baffles and filters. The ducting may also need to be changed for the same reason. The nozzles for the sprays of cleaning solution may need to be changed to due to the different physical and air flow characteristics of baffles and filters. Generally, the entire kitchen exhaust system may need to be changed due to the different operating characteristics of baffles and filters.

7 In the official communication on pages 6 and 7 the examiner has stated that "... to provide a fine spray and a second spray outlet for providing a coarse spray can be viewed as nothing more than mere matters of choice in design absent the showing of any new or unexpected results produced therefrom prior art of record." The known filtering arrangement is to have both filters the same and to have the sprays directed at both filters with both

sprays being the same; or to have a coarse spray and coarse filter as the first stage, and a fine spray and a fine filter as the second stage of filtering. To have the fine spray and the fine filter first, with the coarse spray and coarse filter second is the opposite of normal filtering systems and is not a mere matter of choice.

8.1 The reason the normal arrangement described above is used is that a fine filter first followed by a coarse filter results in the fine filter becoming clogged quite quickly by the coarse contaminants being filtered. By having a coarse filter first then a fine filter the coarse filter captures the coarse contaminants but allows the fine contaminants to pass through so they can be captured by the fine filter. This results in the two filters having a much longer operating cycle. The European patent office has acknowledged the patentability of this feature and I attach marked A a copy of the office action from the European patent office.

8.2 The "fine-then-coarse" filter and sprays of my invention is only possible because with my kitchen exhaust system the droplets of the spray combine with the contaminants and are drawn to the fine, first filter. Due to the spray being drawn by the air flow, the first filter is coated with the cleaning solution before it starts to filter the contaminants. As such the combined droplets will easily run down the fine, first filter. Therefore, the fine, first filter will not become clogged. That means the air flow is truly self-cleaning and is able to operate when cooking is taking place. It is contrary to the filtering systems that would be used by a person skilled in the art. A person skilled in the art would not have a fine filter followed by a coarse filter as the fine filter would require far more frequent cleaning, and the coarse filter would be redundant. They would have a coarse filter followed by a fine filter.

8.3 By having the fine filter first almost all contaminants are collected by the fine, first filter. Any contaminants, and any remaining water, in the air flow after the fine, first filter will be captured by the second filter. Due to the air flow drawing the spray, as well as the coating of the fine, first filter by the spray, the air flow after the fine, first filter will have a relatively high moisture content. This is particularly so if the second spray is used. The primary purpose of the second filter is to remove moisture from the air flow. The air after the filtering system should have a low moisture content to prevent water deposition in the subsequent ducting. Water deposition will cause leakage, corrosion and rusting. These can be very expensive, and often are very difficult, to repair.

9. US 3616744 of Jensen

9.1 This specification is of limited relevance due to the great vertical height involved in the system. It cannot be installed within an exhaust hood. Its is external of the exhaust hood. It would constitute a significant space restriction and could not be used in most installations. Kitchens in which exhaust systems are installed normally have limited headroom – the

distance between the cooking surface and the ceiling. The Jensen system is unusable in all such kitchens due to the great vertical height required for it to be effective.

9.2 The exhaust system of Jensen has to be located at rear of a cooking surface. It does not include a hood that extends generally over a stove and which would capture all of the heat, vapors, fumes and contaminants, and directs them into the exhaust system by using the forced air flow due to a fan, and the natural rise of the hot air. It would appear they rely on a very strong air flow from a fan to pull the heat, vapors, fumes and contaminants into the exhaust system at a level very close to the cooking surface. With anything other than an electric cooking system, this high air flow speed may prove to be significantly disadvantageous as it might "blow out" a gas flame. Most commercial kitchens use gas. As such, use of the Jensen exhaust system is contra-indicated on safety grounds.

9.3 Also, a water bath 50 contains water and all of the grease and other contaminants removed at the first stage. The grease and other contaminants will rest on top of and cover the water as most grease and oils are less dense than water. As such the drain conduit 52 will drain away the water. By then the grease would have hydrolyzed into a glycerine-like mass due to the lower temperature of the water. That mass will tend to clog and block the conduit 58 once the water is drained. The only way this could be overcome would be by using very hot water to reverse the hydrolization and the formation of the glycerine-like mass, or by having degreasers/detergents in the cleaning solution. Very hot water is quite expensive to heat in the volumes required, and requires special pipes. Degreasers/ detergents should not be used if there is any risk of the spray passing onto the cooking surface. As such the Jensen system will become clogged due to the collection of the grease in the water bath 50, unless a very expensive hot water supply is used.

9.4 In Jensen the first water spray 56 is at the constricted opening 47 and is directed at the water bath 50. As such some of that spray 56 could be deflected and pass over the cooking surface. This would prevent the Jensen system from being used in a commercial kitchen. In addition, Jensen has fogging nozzles 94 that are identical to the fogging nozzles 56 and which are directed against the air flow and towards the water bath 50.

On page 4 the examiner states "which would inherently enable the spray to be drawn on the path onto a first surface of the first filter". The first spray the examiner considers to be the sprays from nozzles 56 **and** 94. This is contrary to the teachings of Jensen. In Jensen at column 5 line 50 the specification states:

"The fogging mist discharged from the fogging nozzles 56 along the inner lower edge 36 of the exhaust duct together with the venturi action create a low pressure area within the duct inwardly adjacent to the contracted opening 47."

It is further stated at line 60:

"This causes the contaminants to settle on the water, which is continually agitated by the spray from the fogging nozzles."

For the water to be agitated, the spray from the fogging nozzles must be at a reasonably high pressure and of a large droplet size – particularly as it agitates the water. Agitation requires the spray to force the water into motion. This requires a strong spray with high pressure and large droplets. Each nozzle will produce droplets that are generally of substantially the same size, with the size being in part determined by the opening of the nozzle. A fog is a very fine, gentle and slow moving spray that would not be capable of agitating a water surface. To agitate a water surface will require a spray having large droplets under high pressure. As the spray from the fogging nozzles is perpendicular to the air flow, is of relatively high pressure and the water droplet size is large, the air flow will not and can not draw the spray along the air flow path. This will apply to the nozzles 56 and 94. Furthermore, to cause a low pressure area by venturi action will also require the sray from nozzles 56 to have a large volume of water at relatively high pressure and speed. Otherwise there will be no venturi action to cause a low pressure area. Jensen is inconsistent in referring to fogging nozzles, yet requiring the spray to perform functions that a fog spray cannot achieve.

9.5 This conclusion is supported by Jensen as in Fig. 1, the spray 56 is directed downwardly at the water bath 50. There is no statement that the air flow would draw the spray along the path to a first surface of a first filter 60. In fact the specification appears to be describing something quite different due to the reference at line 60 mentioned above – "which is continually agitated by the spray from the fogging nozzles.". If the spray is agitating the water in the bath, it can't be drawn along by the air flow. A spray that is capable of being drawn along the air flow path could not agitate the water in the bath. A spray that is capable of being drawn along the air flow path could not cause a low pressure area by venturi action.

9.6 The examiner has provided no evidence or explanation as to why he considers the drawing of the first spray along the path onto a first surface of the first filter to be inherent and enabled by Jensen. A fair reading of Jensen gives exactly the opposite conclusion. With Jensen having seven sprays in the air flow path Jensen is not contemplating the air flow drawing the sprays onto the baffles 60, 90. If the spray was to be drawn by the air flow, Jensen would not need seven sprays arranged along the air flow path. Jensen describes the nozzles 94 as being identical to the nozzles 56, as are the nozzles 96. If the spray from nozzle 56 is to be drawn along the air flow path, the sprays from nozzles 94 and 96 will also be drawn along the air flow path as all are identical. To have so many sprays being drawn

along by the air flow would provide such a mass of water in the air flow that the two baffles 60, 90 could not remove the moisture from the air flow. This means the air flow after the second baffle 90 will still have a high water content. The air after the filtering system should have a low moisture content to prevent water deposition in the subsequent ducting. Water deposition will cause leakage, corrosion and rusting. These can be very expensive, and often are very difficult, to repair.

9.7 Furthermore, the passage in column 5 line 73 to column 6 line 10 of Jensen makes it clear that the air flow still contains minute particles of contaminants after passing through the spray from the fogging nozzles 56. That means the spray from nozzles 56 must have removed the coarse contaminants, although I doubt that is possible. The air flow is partially saturated with water vapor from the first stage fogging nozzles 56. As the air steam moves upwardly it encounters a second stage fogging vapor from the second stage fogging nozzles 94 beneath and directed away from the first baffle 60. As the air stream was partially saturated with water vapor before the fogging vapor from the second stage fogging nozzles 94, after the second stage fogging nozzles 94 the air stream will be substantially saturated with water vapor. It then receives a second washing action. The examiner appears to be arguing that the invention as claimed regarding the combining of droplets is the same as contaminants being captured by an air flow that is partially saturated. In saturated air the water is in the gaseous or vapour phase. This is totally different to droplets, which are in the liquid stage.

9.8 The ability of a spray to be drawn along an air flow path by the air flow depends on a number of factors: the fluid of the spray, air flow speed, nozzle shape and the spray shape, droplet size, and fluid pressure. For the spray to be drawn onto a filter to coat the filter surface requires these factors to be considered as well as the distance of the spray from the filters, and the location and direction of the spray relative to the filter.

9.9 Furthermore Jensen discloses first stage fogging nozzles 56, second stage fogging nozzles 94 and third stage fogging nozzles 96, as well as duct washing spray nozzles assemblies 98. The examiner has referred to a second spray outlet 118. I can find no reference to that in Jensen. To me, the examiner means the spray outlet 98. The spray outlets 98 are described as being for "cleaning the duct after each shift of operation of the grill 12". This is against the requirements of my system as claimed – to be operated when cooking is taking place. If the sprays 98 are to clean the duct, this confirms my belief that the sole purpose of the spray from nozzle 56 is to agitate the water bath 50 and to cause a low pressure area by venturi action; and the sole purpose of the spray from nozzles 94 is to agitate the water bath 50.

9.10 There is an interesting passage in Jensen at column 5, line 47 where reference is made to "an exhaust fan, not shown". However, at column 6, line 48, reference is made to "The airstream which has now been virtually cleansed of all contaminants travels upwardly by convection through the second-stage baffle 90 in the same manner as that previously described during its passage with the first-stage baffle 60." Convection or fan? Convection implies the fan is off. So how can the air flow be drawing the first spray? Jensen requires a high air flow but it is impossible to have a high air flow by convection. The reference to convection is incorrect.

9.11 The examiner has referred to plate below the first filter as being 35 or 40. I acknowledge that the plate 35 is below the first filter 60. However, the reference numeral 40 is, in the words of Jensen, "an elongated pan mounted on the rear wall 23 of the range 10 below the air exhaust duct 30...". I believe the reference numeral 40 is not used for a plate but is for an elongated pan that forms the water bath 50. This is how Jensen describes it. The plate 35 does not and cannot collect the first spray as the first spray is from nozzle 56 which is below the plate 35. Also, for the nozzles 94 and 98, any spray that contacts the plate 35 will be deflected by the plate 35. This is primarily due to the angle of inclination of plate 35. That angle will prevent any collection of water due to gravitational forces overcoming the surface tension so that the water will run off and into the trough 43. Using the reference numerals of Jensen, my invention as presently claimed requires the plate 35 to be mounted below the first filter 60 for collection of the first spray 56 to prevent any of the first spray 56 from contacting the cooking surface 12.

As is required of the invention as claimed, the plate is mounted below the first filter for collection of the first spray. The baffle or plate 35 of Jensen is above the first spray and therefore cannot collect the first spray. Similarly, the "plate" 42 that constitute the bottom of the trough 43 is mounted below the "first" baffle 60 and may, in a limited context (as part of the trough 43) be considered as being for collection of the first spray, but cannot be considered as enabling the self-cleaning kitchen exhaust system to be operative when cooking is taking place below the plate. The plate 42 is parallel to and aligned with the cooking surface 14.

9.12 If the water bath 50 becomes full, the water and contaminants in the bath 50 will spill over front edge 45 and, as can be seen from Fig. 1, would flow onto the upper cooking surface 14 and articles of food being cooked, as is shown by the reference numeral 15. The edge 45 would provide a natural pouring lip. As the cleaning solution would contain degreasers/detergents as well as contaminants this is highly dangerous, and would prevent the Jensen apparatus from being used. Again, the use of Jensen is contra-indicated on the grounds of safety.

9.13 On page 5 the examiner refers to the plate 35 as being a baffle depending from the top and intermediate the front wall and the rear wall. As can be seen from Fig. 1, the plate 35 depends from the bottom edge of the front wall 32. If the examiner considers 53 as the front wall, then 32 is actually the front of the exhaust duct, not a baffle.

9.14 In relation to claim 6, the two filters 60, 90, are mounted to both the front wall and the rear wall. Either the plate 35 is a plate within the meaning of claim 1, or is a baffle within the meaning of claim 5. It can't be both as a plate and a baffle are two different components. Furthermore, as the filters are mounted to both the front wall and the rear wall, it is clear that the baffle does not extend between the front wall and the rear wall.

9.15 Examiner Price has acknowledged that there is a possible exception of the second outlets providing a coarse spray in Jensen. Jensen refers to the fogging nozzles 94 being identical to the fogging nozzles 56. The fogging nozzles/conduit assembly 96 is described as being "substantially identical". Therefore there is no differentiation in Jensen between all of its sprays.

9.16 Examiner Price negates the provisions of the two different sprays as being merely matters of choice, and they do not show any new unexpected results. Not one of the prior art on record differentiates between the varying sprays provided. To vary them in the manner claimed is not a mere matter of choice and goes against established practice. See my earlier discussion in part 8 above.

9.17 On page 7 of the official communication there is consideration of claim 7. Examiner Price refers to the bottom plate 42. The reference numeral 42 is described in Jensen as being a low wall of the elongated pan 40, which also has a forward wall 43. Jensen itself describes the plate 35 as being "a lower defection portion" of the exhaust duct. The examiner is referring to the bottom plate 42 as equivalent to the plate of claim 1 as well as the deflecting portion 35. Which is it? It can't be both.

9.18 I have never seen a kitchen exhaust system such as that disclosed by Jensen in the market as it cannot work in practice, and would not be permitted under health and safety laws.

10. US 3805685 of Cams

10.1 As is clear from the description at column 7 line 32 through to column 8 line 21 the Cams system is for washing of the filter after cooking has taken place. As such it would

significantly alter how Jensen works if combined with Jensen. Furthermore, Cams is a more traditionally-formed kitchen exhaust hood that extends well over the cooking surface. It is physically impossible to incorporate this into Jensen, or Jensen into Cams. They are completely opposite systems. It would be impossible to incorporate the spray system of Jensen into Cams as Cams is not designed for such a spray system. Additionally, it would not be possible to incorporate the exhaust hood of Cams with the Jensen system as the spray system of Jensen is specific for its air flow path.

10.2 Also, Cams has only one filter and not two filters. There is no mention of relative coarseness and fineness of the sprays.

10.3 The structure of the apparatus is such that the plate 46 could be considered as being the plate of my invention as claimed. It is visible from the drawing (but only in the drawing) that there is a slight upturning at the lip at the end of the plates 46, 64.

10.4 However, the entire disclosure is directed at post-cooking cleaning. As such, the sprays are not drawn by the air flow. There is no mixing of droplets of contaminants and droplets of cleaning solution. The filters are not coated with the cleaning solution. The spray is trying to clean the filters when there is no air flow.

10.5 The examiner has described Cams as disclosing an exhaust hood bottom plate (80). Cams refers to (80) as being a sheet metal baffle. The bottom section is the reference numeral (78). This is how it is termed by Cams. The baffle (80) is used to divert or direct the fumes to an entrance baffle 82. The entrance baffle 82 extends upwardly from the baffle (80). The filter 84 is supported by brackets (86) for ease of removal. The brackets (86) are not baffles. I take the brackets 86 to be relatively small components, usually of metal, that hold the filter 84 in place, and do no more. Cams does not disclose anything that differs from this view. A baffle is to direct air flow while brackets are to support the filter. The baffle is the baffle plate (80). The bottom plate is the bottom plate 78. The examiner's construction of Cams is directly against the teachings of Cams.

10.6 Consider column 4 lines 62 to 66 – "The function of a grease filter is to provide ample surface area to cool the vapors from the cooking units sufficiently for the grease to the condensed and deposited on the filter media." The cooling of the vapors/contaminants makes them more difficult to remove. This is directly against the teaching of my invention as claimed as with my invention the cleaning takes place when cooking is occurring. As such the vapors are hot and are removed while still hot and more easily removed. It is totally contrary to how my system operates, and to how my system is claimed.

11 US 5359990 of Hsu

11.1 This, like Jensen, is a vertical system. It suffers from the same problems as Jensen as mentioned in Part 9 above. Those comments are therefore repeated and reaffirmed for Hsu.

11.2 There are some similarities between Hsu and Jensen as both have a pan or trough at the bottom of the air flow path, and both use many spray outlets thereby saturating the air flow with water vapor. However, Hsu has a somewhat normal form of exhaust hood and the air inlet within the exhaust hood. Hsu has a double path for the air flow separated by the intermediate plate 13. That plate 13 causes an abrupt 180° turn in the air flow path above the water trough. This will cause at least the majority of the heaviest contaminants to drop from the air flow and to fall into the water. This is confirmed by Hsu at column 2 line 33:

"…. forcing oil mixed in some to mix with the water and drop down owing to its large specific gravity into the separating tank 43."

11.3 The specification at column 2 lines 24 to 43 describes that the spray nozzle 31 sprays clean water for "cleaning the oily smoke passing through the first and second passage ways 10, 10 and forcing oil mixed in the smoke to mix with the water and to drop down owing to its large specific gravity into the separating tank 43". A significant problem with this is that the first spray nozzle 31 is above the first filter plate 32. The first filter 32 is mounted near the inlet opening 15 of the first passage way 10 and is made of many layers of bent, continuous, cotton sheets or filtering cotton paper and is sustained by a support rod 35. I assume the rear filter plate 33 is the same as the front filter plate 32 as there is no description of the rear filter plate 33. With the first spray 31 being upstream of the first filter plate 32 it is not certain how spray from the first outlet 31 can mix with the oil in the smoke to drop down into the separating plate 43 as the filter 32 is between the first spray 31 and the separating plate 43. Hsu is therefore technically inconsistent and unreliable. Also, being a cotton paper filter, it will quickly become clogged with spray, oil and contaminants. This is recognized by the description at column 2 lines 38 to 43 where it stated that several swingable windows 16 are provided in a side wall of the smoke housing 1 as shown in FIG. 1, to be closed or opened. This would enable the filters to be removed for replacement. This means that Hsu is not self cleaning. Hsu is operating in a manner contrary to my system as claimed.

11.4 There is no mention that the further sprays 31 downstream of the first filter 32 are for spraying the rear surface of the filter 32. Also, there appears to be no spray directed at the second filter 33.

11.5 With the first spray 31 operating there is a possibility of the spray bouncing off the first filter 32 and out through the opening 15. This is contra-indicated on safety grounds. There is no mention of relative fineness or coarseness of the sprays or the filters, nor of the spray being drawn by the air flow. As is discussed in paragraph 9.7 above in relation to Jensen, with six sprays in the air passage way it is unlikely that Hsu is anticipating the spray being drawn by the air flow. If the spray was being drawn by the airflow, it would not be necessary to have six sprays arranged serially along the passageways. If the sprays were to be drawn along the air flow path, the six sprays would provide such a mass of water in the air flow that the problems mentioned in paragraph 6.6 above would be excessively exacerbated.

12 EP 0029807. This has a plate 11 that operates more in the nature of the plate of my invention. I note that it can be considered to extend from the front wall (no reference numeral supplied) but there is no upwardly directed projection. The examiner has given the upwardly directed projection a reference numeral 11. This is the reference numeral for the bottom plate. It can't be both. The examiner has referred to the upwardly directed projection 11 extending between a baffle 6 and rear plane wall. Claim 9 requires that the projection is set upwardly to a height at least as high as a mounting of the filter. I cannot find that feature in the '807 citation. This feature creates a tortuous path so that more of the spray 24 cannot escape the exhaust hood. See paragraph [0052] of my application.

13 Alliger 3659402

13.1 The important passage is in column 3 lines 11 to 18:

"Disposed in the conduit 10 in advance of the screen network 14 is a water spray assembly 16. This water spray assembly is upstream of the screen network 14 and supplies a fine spray in the direction of arrows 18 at an angle to the screen network so that the water front from the spray assembly 16 and the dirty gases passing in the direction of the arrows 12 enter the screen openings together and mix and wet out in an optimum manner."

13.2 Even claim 1 of Alliger makes it clear that spray is "for continuously spraying said screen network". There is no reference to the air flow drawing the spray onto the screen.

14.1 The Lyon reference has been referred to in the response to the first office action. All of the comments about Lyon are applicable to Dorr 3944451.

14.2 In Lyon et al., the relevant disclosure is that fresh water is sprayed against the bottom and top of filter pad 106. This highly wets the pellets in pad 106 so that pad 106 acts as a final transfer or separation stage for any contaminants remaining in the air.

14.3 With Lyon the spray from spray outlet 114 is to saturate the final scrubber pad 106. As is described at column 5 lines 6 onwards, a gas burner is used to form SnO_2, H_2O and HCl. The SnO_2 will be in solid particle form; the HCl will be in gaseous form (see line 20); and the H_2O will be gaseous. Even as it enters duct 33 the air will be at about 350° to 400°F. Water is injected into the air steam by nozzles 50 to cool the air stream to about 140° to 160°F. This rapid cooling effect promotes separation of the pollutants from the air steam (column 6 lines 22 onwards). The HCl gas condenses and falls into bath L. The wet SnO_2 particles agglomerate to form larger particles (i.e. larger particles of SnO_2) that are more easily separated with scrubber 30. At column 7, line 8 onwards, it makes it clear that the liquid in bath L will have fresh water, HCl acid, and solids removed from the air.

14.4 HCl gas in the air stream reacts with the entrained liquid to form HCl acid, and the particulate matter becomes highly wetted with the liquid. As a result, most of the contaminants are collected in bath L.

14.5 The air also passes through plates 82, 84 and, due to a venturi effect, entrained particles impinge directly against the plates and fall back into bath L.

14.6 The most pertinent description in Lyon is at column 8 lines 28 to 61. Lyon has a first filter that is the water bath L. The water bath L removes most of the HCl gas and other contaminants. The air and the remaining HCl gas is then drawn upwardly by the force of fan assembly 36 but against the force of gravity. Scrubber pad 106 extends across the entire cross-sectional flow area of upper section 46. Water sprays 114 are below scrubber pad 106 and direct a continuous pressurized spray of fresh water upwardly against the bottom of scrubber pad 106. Similarly, an upper fresh water spray assembly 118 is mounted above scrubber pad 106 that directs a continuous pressurized spray of water downwardly and against the air flow, but with the force of gravity, against the top of scrubber pad 106.

14.7 The scrubber pad 106 is formed by upper and lower perforated polypropylene support grates 110 and 112, and an intermediate filter bed 113 of microreticulated polyester fibrous pellets packed between the grates 110 and 112. As a result of spray assemblies 114 and 118, the pellets in pad 106 are highly wetted and the scrubber pad 106 acts as a final transfer or separation stage for any contaminants (i.e. HCl gas) in the air. The water from assemblies 114 and 118 continuously washes scrubber pad 106, keeping it clean and effective as a final filtering and separating stage.

14.8 Demister pad 108 removes the water from the air stream before it enters the housing of fan 36 and is exhausted to the atmosphere. The demister pad 108 is similar to the scrubber pad 106 in that it is also formed by upper and lower perforated polypropylene support grates 122 and 124, and an intermediate filter bed 126 of microreticulated polyester

fibrous pellets packed between the grates 122 and 124 and which collects the water as the air passes therethrough.

14.9 Claim 1 requires: "a first spray outlet for providing a first spray into the air flow before the first filter to enable the first spray to be drawn along the path onto a first surface of the first filter; and a second filter in the path for the air flow downstream from the first filter; wherein the first spray has droplets sized to combine with droplets of a contaminant to form combined droplets in the air flow before the first filter to assist the combined droplets being captured by the first filter; and a plate mounted below the first filter for preventing the first spray escaping from the self-cleaning kitchen exhaust system such that the self-cleaning kitchen exhaust system is operable when cooking is taking place below the plate.".

14.10 Lyon is for scrubbing air not cleaning the air **and** itself. Lyon doesn't clean the exhaust system. Lyon only removes the gas from the air. The fresh water spray in Lyon is meant to enhance the performance of the pellets in the filter pad 106. There is no disclosure or teaching of the fresh water sprays being designed to act on contaminants while still in the air. Instead, the fresh water sprays are targeted at the scrubber pad 106 to wet the pellets of microreticulated polyester fiber so that the pellets can perform the removal of contaminant gasses. The fresh water sprays in Lyons et al. are not targeted at contaminants in the air before the scrubber pad 106.

14.11 Furthermore, Lyon does not disclose that the first spray has droplets sized to combine with droplets of a contaminant to form combined droplets in the air flow before the first filter to assist the combined droplets being captured by the first filter. Also, with Lyon contaminated fluid drips down into the bath L. As such, the system of Lyon cannot be used when cooking is taking place. In Lyon, there is no disclosure or teaching of spraying the cleaning solution into the air flow to combine with contaminants before the contaminants reach the first filter. This feature provides the advantage of cleaning the air of contaminants that are still in the air before reaching the first filter. This minimizes clogging of the first filter and increases the effectiveness of the exhaust operation. It also means that wherever the air goes, the cleaning solution goes, since the contaminants and the cleaning solution are carried by the airflow. In Lyon bath L is a first filter. Scrubber pad 106 may collect contaminants. Demister pad 108 removes water from the air. Neither pad 108 nor 106 is inclined at an angle to have the mixture of contaminants and fluid run off the pad as is required of dependent claim 12 of my application. Moreover, the air flow of Lyon contains HCl gas as a contaminant, which is inherently not applicable to a kitchen exhaust system.

14.12 Claim 3 requires that the first spray outlet includes at least one nozzle for providing a fine spray, and a second spray outlet includes at least one further nozzle for providing a coarse spray. This is not taught nor suggested by Lyon.

14.13 Claim 5 adds structural features including a baffle depending from the top and intermediate the front wall and the rear wall. There is no such baffle in Lyon.

14.14 Claim 6 requires that the baffle extends between the front wall and the rear wall. Again, there is no such baffle in Lyon.

14.15 Claim 7 relates to the plate and that the plate extends forwardly from one of the front wall and the rear wall beyond the baffle. Again, there is no such baffle in Lyon.

14.16 Similarly, in claim 8 the plate has an upwardly directed projection extending between the baffle and the one of the front wall and the rear wall. Again, there is no such baffle in Lyon nor any such projection.

14.17 Following on from that, claim 9 requires the projection to extend upwardly to a height at least as high as the mounting of the first filter to the baffle. Again, there is no such baffle in Lyon nor any such projection.

14.18 In claim 10 the spray outlet is mounted on the plate. This is not disclosed nor taught by Lyon.

14.19 Lyon does not disclose nor teach that the first filter is inclined with respect to the path as required by claim 12. For claim 14, Lyon does not disclose or teach that the first filter is at an angle of inclination to the path substantially the same as that of the second filter. The inclination of the filters of the present application and the advantages it gives are clearly stated in the specification of the present application at the end of paragraph [0036]; and in paragraphs [0039], [0040] and [0043]. If the filters were of the type usually used in kitchen exhaust systems, there would be a considerable risk that the spray would pass through the filter, or would rebound from the filter.

14.20 Independent claim 17 requires the first spray outlet to provide a fine, first spray of a cleaning solution into the air flow before the first filter to enable the fine, first spray to be drawn into the first filter by the air flow, wherein the fine, first spray has droplets sized to combine with droplets of the contaminant to form combined droplets in the air flow before the first filter to assist the combined droplets being captured by the first filter, and a plate mounted below the first filter for preventing the fine, first spray escaping from the self-

cleaning kitchen exhaust system such that the self-cleaning kitchen exhaust system is operable when cooking is taking place below the plate. I repeat and reaffirm the comments made in relation to Claim 1.

14.21 Claim 18 requires the plate to be mounted below the first filter and to have an upwardly directed projection at an end of the plate. Lyon is silent on both features.

14.22 Claim 19 is an independent method claim and again requires a first spray into an air flow before a first filter, the first filter being mounted in a path of the air flow to enable the first spray to be drawn along the path onto the first filter; the first spray being able to combine with droplets of the contaminant in the air flow before the first filter; the first spray being able to coat the first filter to assist the first filter in capturing at least one droplet of the contaminant in the air; and a plate mounted below the first filter for preventing the first spray escaping from the self-cleaning kitchen exhaust system such that the self-cleaning kitchen exhaust system is operable when cooking is taking place below the plate.

I repeat and reaffirm the comments made in relation to Claim 1 as they are equally applicable here.

14.23 In claim 20 the first spray is drawn along the path under the influence of the air flow, and the air flow causes at least a part of the first spray to pass through the first filter. Lyon is again silent on this feature.

14.24 Claim 23 requires the second spray to clean a rear surface of the first filter, and for being drawn under the influence of the airflow to clean a second filter in said airflow path after said first filter. This is not disclosed by Lyon, and cannot be achieved by the construction of Lyon as the demister pad 108 would become waterlogged and ineffective very quickly.

14.25 Claim 24 requires the first filter to be a relatively coarse filter, the second filter is a relatively fine filter, the first spray is a relatively fine spray and the second spray is a relatively coarse spray. In Lyon the two filters are the same. Lyon is silent about differences between the two sprays.

14.26 Finally, claim 26 requires the second spray to substantially coat the second filter to assist the second filter in capturing at least one contaminant. Lyon is silent on this feature and it cannot be achieved by the construction of Lyon as the demister pad 108 would become waterlogged and ineffective very quickly.

15. In the table below I summarize my understanding of the claims of my patent application and which citations have been raised against which claims. An asterisk indicates independent claim.

Claim	Citations
1 *	Jensen
2	Jensen
3	Jensen Cams
4	Jensen
5	Jensen
6	Jensen
7	Jensen & EP'807 or Hsu or Cams
8	Jensen & EP'807 or Hsu or Cams
9	Jensen & EP'807 or Hsu or Cams
10	Jensen & EP'807 or Hsu or Cams
12	Jensen
14	Jensen
15	[cleaning solution]
16	Jensen Cams
17 *	Jensen Cams
18	Jensen Cams
19 *	Jensen
20	Jensen
21	Jensen
22	Jensen
23	Jensen
24	Jensen Cams
26	Jensen
28	Jensen
40	Jensen
41	Jensen
42	Jensen Cams
43	Jensen Cams
44	Jensen
45	Jensen
46 *	Jensen
47	Jensen
48	Jensen

Claim	Citations
49	Jensen
50	Jensen
51 *	Jensen
52	Jensen
53	Jensen
54	Jensen
55 *	Jensen
56	Jensen Cams
57	Jensen

16. In relation to combinations, Cams is a horizontal system intended to be within a range hood as is the system of my invention. Both Hsu and Jensen are systems designed not to be encased within the range hood but in what would normally be considered the back of the cooking surface. Both would involve a considerable interference with the space occupied by the cooking range in a commercial kitchen. The thickness of the system will have to be accommodated between the cooking range and the wall. Jensen cannot be combined with Cams as they work completely differently. To use Cams with Jensen is to completely change the way Jensen works. Similarly for Hsu and Jensen.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted

Kim Lui SO

22nd Dec, 2008

Date

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European Patent Office
Office européen des brevets

COPY

European Patent Office
80298 MUNICH
GERMANY
Tel: +49 89 2399 0
Fax: +49 89 2399 4465

Formalities Officer
Name: Leroy, Valérie
Tel: +49 89 2399 - 5894
or call
+31 (0)70 340 45 00

Substantive Examiner
Name: Merkt, Andreas
Tel: +49 89 2399 - 2935

Finnie, Peter John
Gill Jennings & Every LLP
Broadgate House
7 Eldon Street
London EC2M 7LH
ROYAUME-UNI

DUE DATE

19/12/08
ENTERED

Application No.	Ref.	Date
03 788 220.6 - 2301	PJF01878EP	19.08.2008
Applicant: So, Kim Lui		

Communication pursuant to Article 94(3) EPC

The examination of the above-identified application has revealed that it does not meet the requirements of the European Patent Convention for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused pursuant to Article 97(2) EPC.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable, to correct the indicated deficiencies within a period

of 4 months

from the notification of this communication, this period being computed in accordance with Rules 126(2) and 131(2) and (4) EPC. One set of amendments to the description, claims and drawings is to be filed within the said period on separate sheets (R. 50(1) EPC).

Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn (Art. 94(4) EPC).

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Merkt, Andreas
Primary Examiner
For the Examining Division

Enclosure(s): 3 page/s reasons (Form 2906)

The examination is being carried out on the **following application documents**:

Description, Pages

1, 5-7, 9, 10	as published			
2-4, 8, 11	received on	27.12.2006	with letter of	22.12.2006

Claims, Numbers

1-28, 29(part)	received on	27.12.2006	with letter of	22.12.2006
29(part), 30-34	filed with telefax on	21.04.2008		

Drawings, Sheets

1/5-5/5	as published

The statements in your letter dated 22.12.2006 have been taken into account and the following conclusions reached:

1. Document D1 discloses (see especially pages 7-8 and the figure) a self-cleaning exhaust system including:
   a first filter (36,38) in a path for an air flow;
   a second filter (46, 48) in the path for the air flow;
   a first spray outlet (45) mounted before the first filter;
   wherein the first spray outlet is to provide a first spray into the air flow before the first filter to enable the first spray to be drawn along the path onto a first surface of the first filter;
   wherein the first spray has droplets of a size being able to combine with droplets of a contaminant to form combined droplets in the air flow before the first filter to assist the combined droplets being captured by the first filter.

The subject-matter of claim 1 differs therefrom in that the first filter is a relatively *coarse* filter and the second filter is a relatively *fine* filter (sets up a relation to each other).

These features offer the advantages of providing a improved filtering efficiency of the exhaust system.

These differentiating features are neither known from nor rendered obvious by the available prior art documents. Hence, claim 1 can be considered as being new and inventive (Article 54 and 56 EPC).

2. As the subject-matter of claim 1 is considered as being new and inventive and claims 2-18 are dependent on claim 1, the subject-matter of these claims can also be considered as being new and inventive in the sense of Articles 54 and 56 EPC.

3. Document D1 discloses (see especially pages 7-8 and the figure) a method of removing at least one contaminant in an exhaust system including:
providing a first spray (45) into an air flow before a first filter (36,38);
the first filter being mounted in a path of the air flow to enable the first spray to be drawn along the path onto the first filter;
the first spray combining with droplets of the contaminant in the air flow before the first filter and
the first spray coating the first filter to assist the first filter in capturing at least one droplet of the contaminant in the air flow.

Hence, all the features of claim 19 are known from document D1 and the subject-matter of claim 19 is not new in the sense of Article 54(1) and (2) EPC.

The subject-matter of at least the documents D2, D4-D8 also anticipate the apparatus of claim 19 and thus it should be considered being not new in the sense of Article 54(1) and (2) EPC.

4. Dependent claims 20-29,32-34 do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of EPC with respect to novelty (Articles 52(1) and 54 EPC), all the features thereof

being already disclosed at least in document D4 (see SR).

5. In order to overcome the objections it appears to be appropriate to delete claims 19-34 from the set of claims.